

REMARKS

Claims 1-11 are pending in the subject application. Applicants have herein amended claims 1, 4, and 9.

Support for the amendment to claim 1 may be found on page 6, line 37 to page 7, line 2, and on page 7, lines 25-26 of the specification, and in originally-filed claim 4. . Support for the amendment of claim 4 may be found in the specification at page 8, lines 17-19. Support for the amendment of claim 9 may be found in Figure 2 and in the specification on page 7, lines 25-28; page 8, lines 17-19; and page 9, lines 19-20.

In the August 4, 2008 Office Action, the Examiner rejected claims 1-11 under 35 USC §103(a) as obvious over Topsoe, et al. (US Patent 6,059,995) in view of Wieland, et al. (US Pat. Publication 2002/0009408 A1) and Maruko, et al. (European Pub. No. EP 1094030 A2).

Applicants respectfully disagree. Topsoe discloses a reforming process of dimethyl ether (DME) and/or methanol -- not of hydrocarbons. A first steam reforming reaction and a second partial oxidation reaction are carried out in series (see Topsoe, col. 1, lines 49-51 and claim 1). One single reactor is used (a fluid bed reactor or a quench type adiabatic reformer - see, e.g., Figure 1). The reforming temperatures are in the range of 166 to 458°C (see Table 1). Topsoe uses the heat of partial oxidation of hydrogen to heat the first steam reforming process (see col. 2, line 6-19).

In contrast, the present invention uses a two-stage reforming process -- starting first with an exothermic autothermal reforming step ("ATR"), which consists itself of a combination of partial oxidation and steam reforming, and a subsequent endothermic steam reforming step ("SR") -- see, e.g., the specification of the present application at

page 6, lines 30-35). This means that the endothermic steam reforming in the present invention is used to "quench" the autothermal process to obtain lower temperatures at the outlet. This aspect of the invention is contrary to the teaching of Topsoe, and thus Topsoe leads away from the present invention.

Topsoe also does not disclose the limitation regarding the content of unreacted hydrocarbons at the outlet of the autothermal reactor stage.

Wieland is cited and discussed in the present specification as EP 1 157 968 A1 (see page 4, lines 10-15). As discussed, Wieland discloses a single-stage ATR process. The temperature ranges disclosed in Wieland for the reaction mixtures are 600 to 900°C. Comparative example 1 (CE1) of the present application is made in accordance with Wieland, example 1 (see page 14, lines 21-23). The unexpected advantages of the presently claimed inventive process versus the Wieland process are clearly demonstrated in the example (see page 14, line 38 to page 15, line 6).

The Maruko reference discloses a reforming method of hydrocarbons using an admixture of oxidizing and reforming catalyst and adding a small portion of oxygen. This is the principle of the well-known autothermal reforming process. Maruko uses a single stage reactor (see Figure 1). The low temperatures of 250 to 350°C mentioned by Maruko refer to the reforming of an aliphatic alcohol, not to the reforming of hydrocarbon (see para. [0014], lines 4-10). Maruko is silent as to any two-step process of autothermal reforming followed by steam reforming. Moreover, Maruko is silent as to specific residual hydrocarbon contents after the autothermal reforming stage.

In sum, none of the references, alone or in combination, disclose or teach a process comprising two successive stages - the first being an autothermal reforming stage and the second being a downstream steam reforming stage at temperatures below 650°C. Additionally, the references do not teach or suggest the added limitation that the

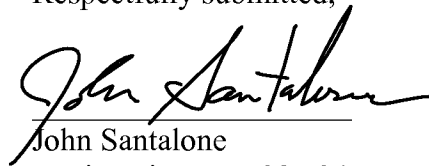
reformat at the outlet of the autothermal reforming stage have a residual hydrocarbon content between 0.1 to 10% by volume.

In light of the foregoing claim amendments and remarks, Applicants respectfully requests withdrawal of the rejections and objections set forth in the August 4, 2008 Office Action and requests allowance of the present application.

No fee is believed due in connection with the filing of the present amendment, other than the fee for the requested three-month extension of time. If any additional fees are due, or an overpayment has been made, please charge, or credit, our Deposit Account No. 11-0171 for such sum.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the number provided below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John Santalone", written over a horizontal line.

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